

A New Parthenogenetic *Timema* from California

(Phasmatodea: Timemidae)

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The timemas are an endemic western family. Species have been described from Arizona, Nevada and California. California claims the greatest number of described species with five now known. Timemas are of interest because of their unique robust appearance and the presence of distinctive asymmetrical genitalia in the males. Species are usually locally abundant and appear as adults from mid to late spring. They are most often associated with chaparral plants and can be found on the most pungent of shrubs. Most species emit an acrid odor when handled. Such an odor is not associated with the species herein described. The taxonomy of the Timemidae was reviewed most recently by Tinkham (1942) and later Strohecker (1966) added two species. The total number of known species now stands at 7.

Parthenogenetic phasmids are not unknown, (see White 1973). To date only a single parthenogenetic phasmatid has been recorded from the United States, but this is the first purported case in the Timemidae. Such a conclusion was achieved by two collectors independently. Mr. H.B. Leech, California Academy of Sciences (retired) wrote the author in 1971 suggesting the possibility after studying a large collection of nymphs and adults which he had made. Subsequent trips to the same location yielded additional specimens, but there were no males. Concurrently, Ms. Genevieve Prlain and Dr. C.D. MacNeill of the Oakland Museum discovered the species at Arroyo Mocho and began extensive studies to determine if any males could be located. They reared individuals from eggs of captive females and discovered no males in the progeny. Continuous collecting each season from 1973 through 1977 has failed to uncover a single male. In all other species of timemas known to this author, adult females are encountered in the field with males atop, not necessarily in copulation. Males are seldom found singly. It would seem that if males were present in the populations examined here, they would have appeared by now. Adults have been reared by Ms. Prlain from adult females collected as immatures during the previous season. Therefore, in any case, males are not necessary in these populations to produce subsequent generations.

This species is being described at the request of the scientists at the Oakland Museum and because of its potential interest to geneticists due to its parthenogenicity.

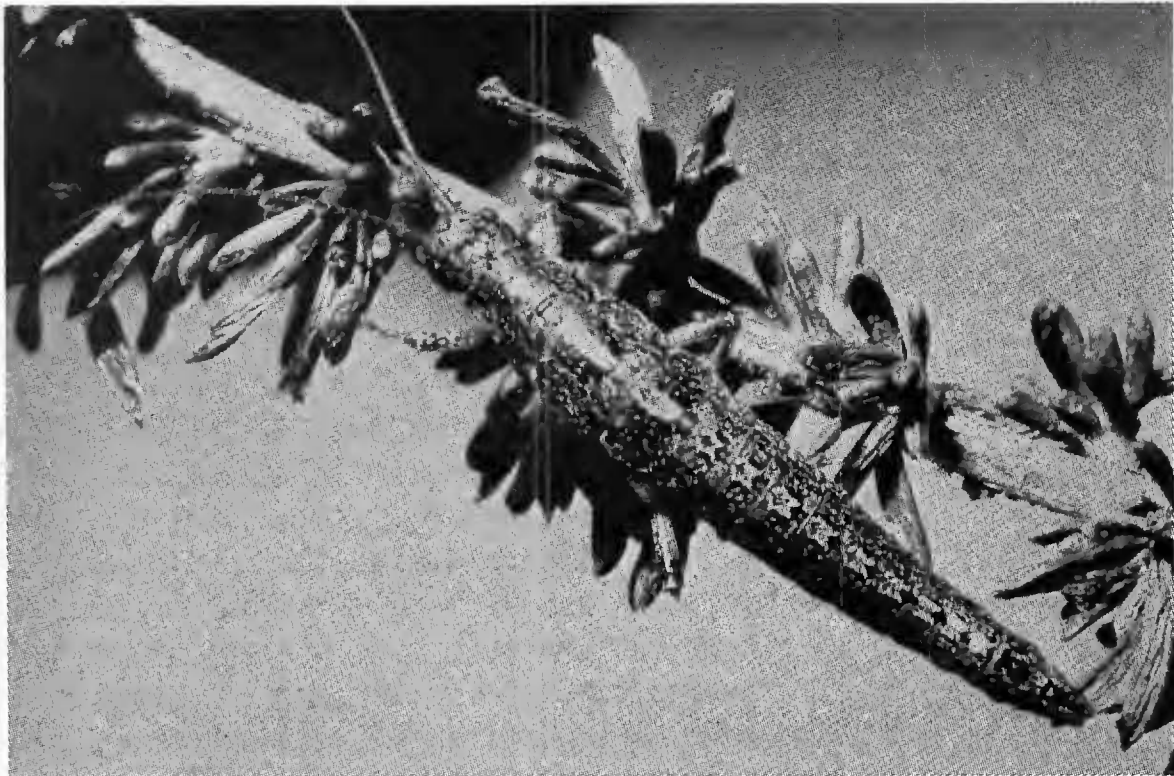


Figure 1. *Timema genevievae* Rentz, new species on chamise.

***Timema genevievae*, new species**

HOLOTYPE FEMALE. California: Alameda County: Arroyo Mocho, 29 May 1974. C.D. MacNeill, R.E. Love collectors. Holotype in California Academy of Sciences, number 13025. Type series taken mostly on chamise, *Adenostoma fasciculatum* H. & A. and mountain mahogany *Cercocarpus betuloides* (Hook.) Nutt.

Description.—Form normal for genus. Head broad and flat, dorso-ventrally flattened; eyes prominent, globular, much more produced than in any other known species. Antenna with 22 articles, positioned well in front of eyes; scape very elongate, four times longer than basal width, somewhat constricted basally; pedicel hardly distinguishable from succeeding antennal articles; internal margins of antennal sockets produced between eyes. Thorax; prothorax 1.65 times broader than long, sides straight, anterior margin somewhat produced (Fig. 2), posterior margin concave; mesothorax slightly smaller than prothorax, sides convex, posterior margin more concave, anterior margin indistinct; mesothorax with lateral margin more strongly convex. Legs stout, undifferentiated, unspined. Abdomen narrowing apically, not modified. Supra-anal plate rather elongate, lying just anterior to middle of cercus, without central sinuation as seen in *T. boharti* Tinkham; tenth tergite produced, emarginate. Subgenital plate (Fig. 3) constricted basally, lateral margins obtusely produced mesad, converging to rather blunt apex. Cercus elongate (Fig. 5), apices subacute, internal dorsal and ventral margins minutely serrate. Ovipositor completely concealed by subgenital plate, valvulae strongly recurved in apical portion, aciculate; dorsal valves longer, more sharply recurved than ventral valves.

Coloration.—Surface of body glabrous; overall coloration intensely greyish brown, dorsum with indistinct longitudinal stripes; margins of thoracic nota and abdominal terga dotted with yellow; ventral surface light grey, each sternum bearing a pair of dark brown spots; legs pale grey, speckled, except apex of hind femur and adjacent tibia solid dark brown, antenna grey brown, first twelve articles somewhat darker.

Holotype measurements.—(in mm) Length body 23.7, length pronotum 2.2, width pronotum 3.5, length mesonotum 2.0, width mesonotum 3.7, length metanotum 2.0, width

	Total length	Length pronotum	Width pronotum	Length mesonotum	Width mesonotum	Length metanotum	Width metanotum	Length Head
Paratop- type n = 21	$\bar{X}24.14$ (± 1.15)	$\bar{X}2.38$ (± 0.08)	$\bar{X}3.44$ (± 0.24)	$\bar{X}1.83$ (± 0.14)	$\bar{X}3.96$ (± 0.13)	$\bar{X}1.45$ (± 0.10)	$\bar{X}4.11$ (± 0.26)	$\bar{X}2.56$ (± 0.26)
Mines rd n = 11	$\bar{X}19.97$ (± 0.97)	$\bar{X}2.11$ (± 0.12)	$\bar{X}1.75$ (± 0.15)	$\bar{X}1.75$ (± 0.11)	$\bar{X}3.48$ (± 0.18)	$\bar{X}1.45$ (± 0.10)	$\bar{X}3.67$ (± 0.16)	$\bar{X}2.0$ (± 0.14)

metanotum 3.8, length posterior femur 3.1, length posterior tibia 3.3, length subgenital plate 2.5

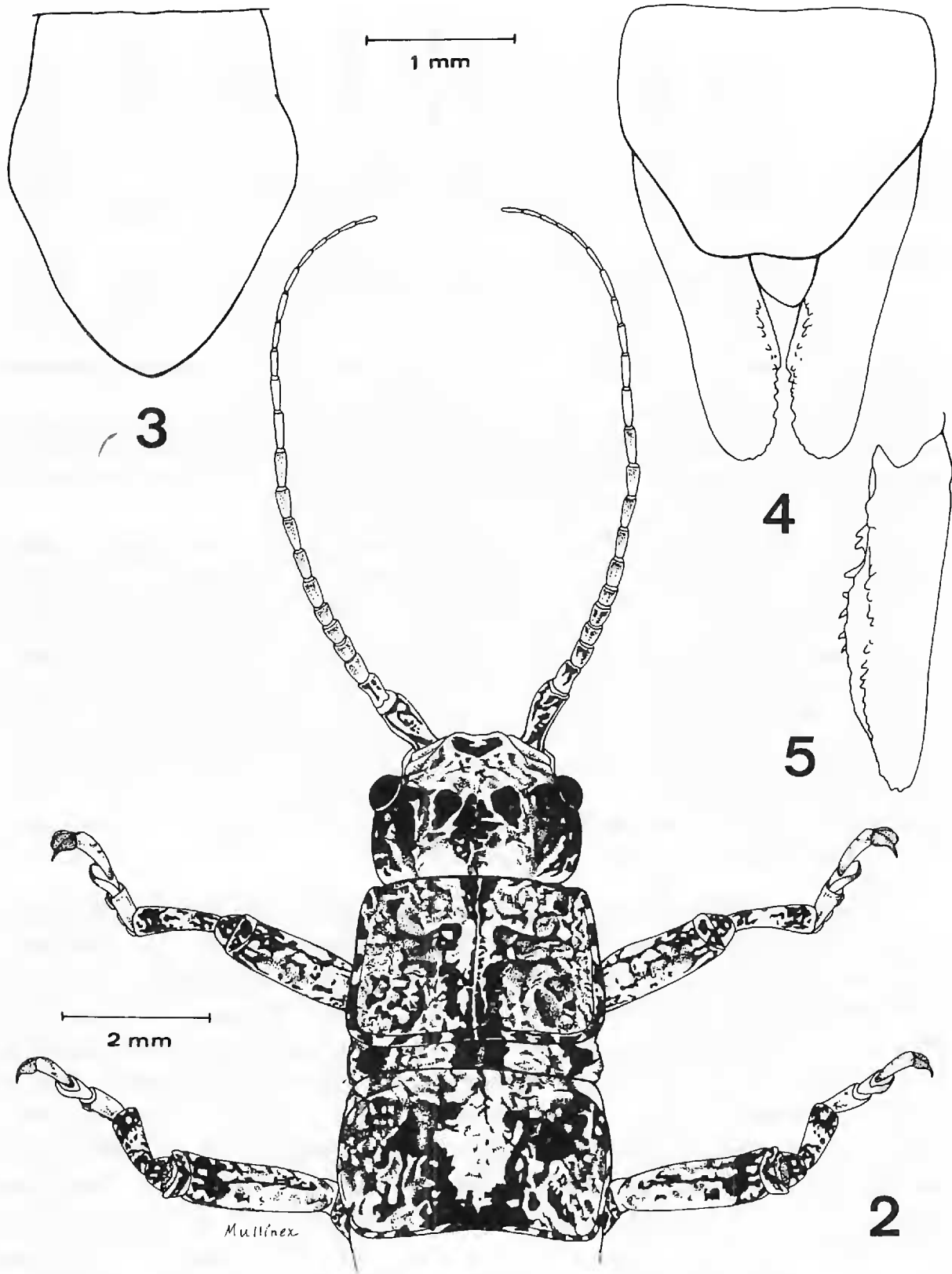
Measurements from the type series were made from liquid-preserved specimens. Specimens from localities other than those listed were pinned and too distorted for accurate measurement. All measurements made with ocular micrometer and are in millimeters. The number in parentheses is the standard deviation.

Records.—CALIFORNIA: ALAMEDA COUNTY: Arroyo Mocho, San Antonio Valley, Taravel Creek, 21-V-1974, 29-V-1974, I-VI-1973 (C.D. MacNeill, G. Prlain, R.E. Love, 62♀, including type, CAS). SANTA CLARA COUNTY: South end of Mines road, 30 mi. by road S.E. of Livermore, 720 m alt., 14-V-1972 (H.B. Leech, 15♀, 1 3rd instar in alcohol, 35♀ pinned, CAS). 28 mi. by Mines road S. of Livermore, 720 m alt., 12-VI-1971 (H.B. Leech, 43♀, pinned, CAS). STANISLAUS COUNTY: Del Puerto Canyon, 2-V-1970, 2-V-1972 (R.M. Brown, 2♀, CAS); Frank Raines Park, Del Puerto Canyon, 2-V-1970 (R.M. Brown, 4♀, CAS). All specimens designated as paratypes. Paratopotypes will be deposited in the Academy of Natural Sciences of Philadelphia and Smithsonian Institution at the request of the Oakland Museum.

Derivation of name.—This species is named in honor of Ms. Genevieve Prlain in recognition of her interest in the bionomics of the species.

E. genevievae Rentz, new species differs from its closest relative *T. boharti* Tinkham (from mountainous desert regions of western southern California) in its greyish, never green, coloration, smaller, less robust size and sculpture of the internal surface of the cercus (Fig. 5). In *T. boharti* the apex of the cercus is truncate to emarginate and always with a prominent dorsal tooth often with several smaller teeth in females. In *T. genevievae* the apex is more or less evenly serrate. The dorsal internal margin of the cercus of *T. genevievae* is serrate along the entire margin but smooth in *T. boharti*. The subgenital plate of the two is also quite different. In *T. genevievae* this structure is more constricted basally with the proximal margins nearly parallel. In *T. boharti* the base of the subgenital plate is not parallel but the margins obtuse. *T. genevievae* can be immediately distinguished from *T. chumash* Hebard (coastal and inland central California) by the much broader and obtuse subgenital plate and the absence of prominent serrations on the cercus.

Ms. Prlain reports that *T. genevievae* shows a preference for chamise both in the field and in the laboratory. Chamise samples from Sierran localities were reluctantly accepted, but the captive timemas always fed on chamise from the type locality and they



Figures 2-5. Fig. 2, dorsal view anterior portion of paratopotype; Fig. 3, subgenital plate; Fig. 4, apex of abdomen, dorsal view; Fig. 5, individual cercus, dorsal view. Figs. 3-5, holotype female, *Timema genevievae* Rentz.

preferred the budding tips. Even though, a few individuals were collected on buckbrush (*Ceanothus cuneatus* (Hook.) Nutt.) and mountain mahogany (*Ceroocarpus betuloides* Nutt.), these shrubs were rejected as food in the laboratory.

Eggs from captive females were placed outdoors and moistened occasionally over winter. In general, they hatched in early January. Usually six weeks and 4-5 instars later, adults were obtained. At the type locality, adults were present from mid to late May and mostly gone by the end of June. Eggs are freely broadcast by females but are sticky and adhere to the first surface touched.

Timemas should be preserved in a fixative, then stored in alcohol. Pinned specimens are usually hopelessly shriveled and distorted. I prefer the fixative described by Williams (1968) for arachnids which is a modification of the widely used Pampel's fixative. Pierce (1942) described a method for drying specimens and then pinning them. Color and form was reportedly preserved. His method was to place the living specimens in 70% alcohol for 1 hour, then transfer to 95% alcohol for 1 hour, then move into xylol for 24 hours. The dried specimen could then be pinned. He also stated that the same results could be obtained by placing the timema into xylol and foregoing the dehydration in alcohol.

Literature Cited

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